



# THREAT OF CHEMICAL WEAPONS IN SYRIA CONFLICT and ITS IMPACT ON BALKAN REGION (with Turkish experiences)

**Prof.Dr. Levent KENAR**  
**Department of Medical CBRN Defense**  
**University of Health Sciences**  
**Ankara -Turkey**

# Chemical Weapons

Chemical substance that is intended for use in military operations to kill, seriously injure, or incapacitate mainly through its physiological effects.

CW agents can be weaponized by loading them into delivery systems such as spray tanks or munitions.



# Chemical Weapons

## 1. Nerve Agents:

Tabun (ethyl N,N-dimethylphosphoramidocyanidate),

**Sarin (isopropyl methylphosphanofluoridate),**

Soman (pinacolyl methylphosphanofluoridate),

GF (cyclosarin) (cyclohexylmethyl phosphanofluoridate),

Vx (o-ethyl-[S]-[2-diisopropylaminoethyl]-methylphosphonothiolate);

## 2. Blister agents:

**Sulfur mustard**, Lewisite (2-chlorovinyl dichloroarsine); white phosphorus

## 3. Choking agents:

Phosgene, **Chlorine**;

## 4. Blood agents:

Hydrogen cyanide, Cyanogen chloride;

## 5. Incapacitating agents:

BZ (3-quinclidinyl benzilate);

## 6. Riot control agents:

CN (o-chloro acetophenone)

# Chemical Weapons

## Effects on Health Care Systems

- **Intensive care** and medical support increases
- Potential for creating injuries at various levels
- Wearing protective equipment adversely affects **work performance**
- Due to the need for decontamination, treatment procedures, protection and follow-up of the facility, **additional staffing** is required
- **Decreased visual and touch sense**, and communication makes medical intervention difficult
- It may be necessary to evacuate the medical support element to the **clean zone**
- The risk of exposure to **secondary contamination**
- **Special protective and pre-treatments** may be required
- Casualties should be classified according to their medical care priorities (**triage**)



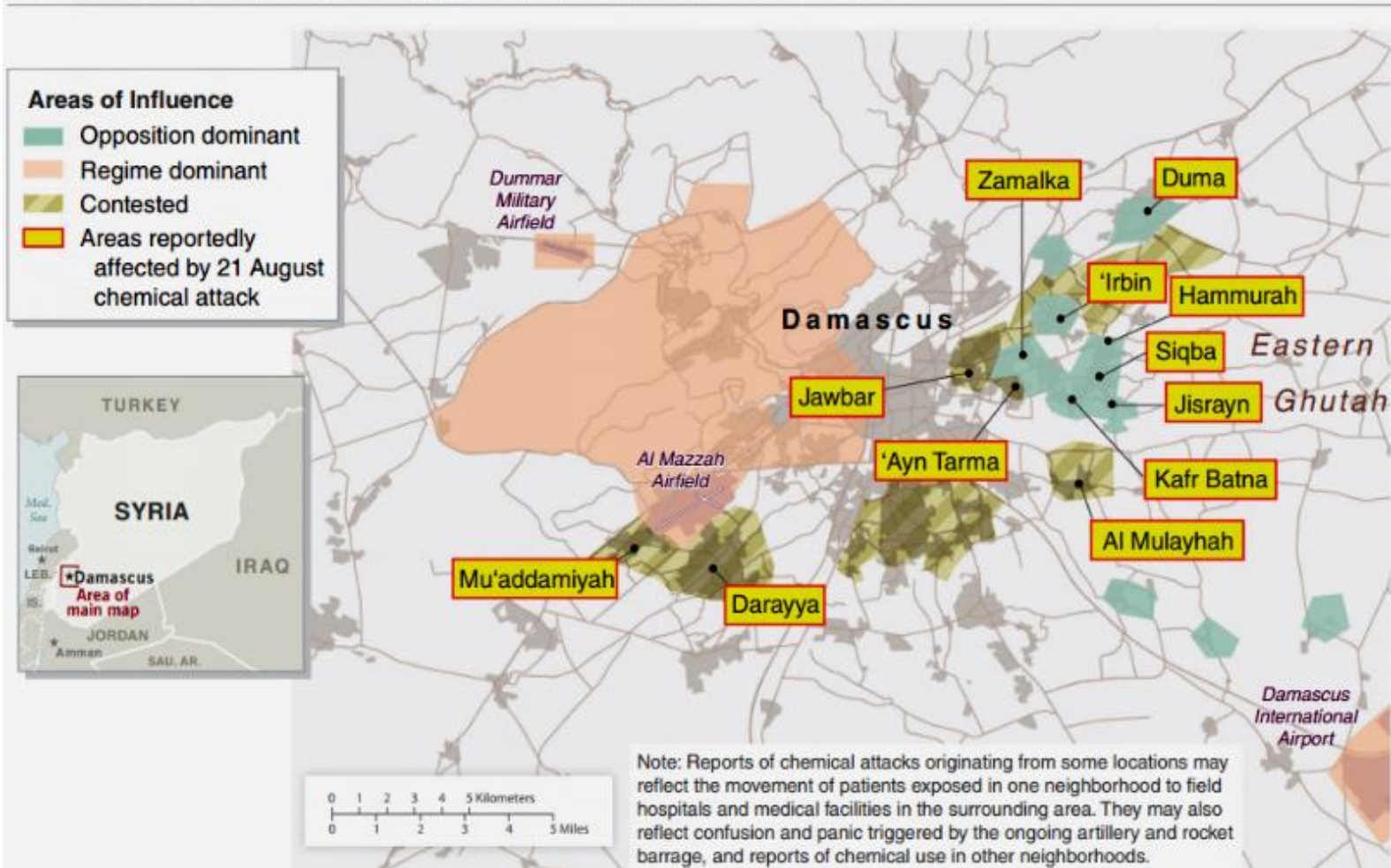
# Chemical Weapons



## HISTORICAL PERSPECTIVE OF CHEMICAL WEAPONS

- 1915-1917 1st WW-chemists' war (chlorine, phosgen, mustard)
- 2nd WW (CW not used but gas chambers, nerve agents synthesized)
- Yemen War (1963-1967) (NA, mustard, phosgene)
- Iran-Iraq War (1980-1988) (NA, Mustard, HCN)
- Bhopal, India (1984) (Methylisocyanate, 5000 dead, 200,000 injured)
- Tokyo subway stations (1995, 12 dead, 5500 injured, sarin detected in 2 hours)
- USA-Iraq conflict (2002-2003)
- ..... → Recent years

## Syria: Damascus Areas of Influence and Areas Reportedly Affected by 21 August Chemical Attack





## Recent Chemical Attacks in Syria



- Chemical weapon was used in 161 attacks during Syria conflict
- 81 attacks with chlorine gas
- Mustard attack in Marea-Syria (21 August 2015)
- Mustard/Chlorine attack in Taza Hurmatu/Kerkük (08 March 2016)
- Mustard attack, El-Bab, Syria (26 Nov 2016)
- Sarin-Klor-?? Attack , Khan Sheikhoun-İdlib, Syria, 04 April 2017
- Sarin-Chlorine gas attack, Douma city, killed 70 people, 07 April 2018

## MUSTARD CASES

- 26 November 2016, mustard attack at Al-Bab region,
- oily blackish smoke with garlic smell from the explosion of a trapped bomb,
- 22 injured, 13 of them evacuated to Turkey,
- No chemical protective suit declared,
- Hospitalized within 24 hours and given symptomatic treatment in ICU,  
2 patients pancytopenia,  
others discharged.



- 
- Erythema with multiple fluid-filled blisters
  - Scalp, neck, arms and hands, upper extremities and axilla
  - Biopsy(subepidermal blister formation)
  - More than 25% body surface affected
- 
- Lesions left intact for healing
  - Re-epithelisation
  - No secondary infection
  - Hypopigmented and hyperpigmented zones
-



## Good Nursing Care

- Infection prevention
- Local wound care
- Fluid replacement therapy
- ICU discipline
- Well-planned nutritional support
- Multidisciplinary team  
(pulmonologist, dermatologist, hematologist, infectious disease experts, etc)



## Recent Chemical Attacks in Syria

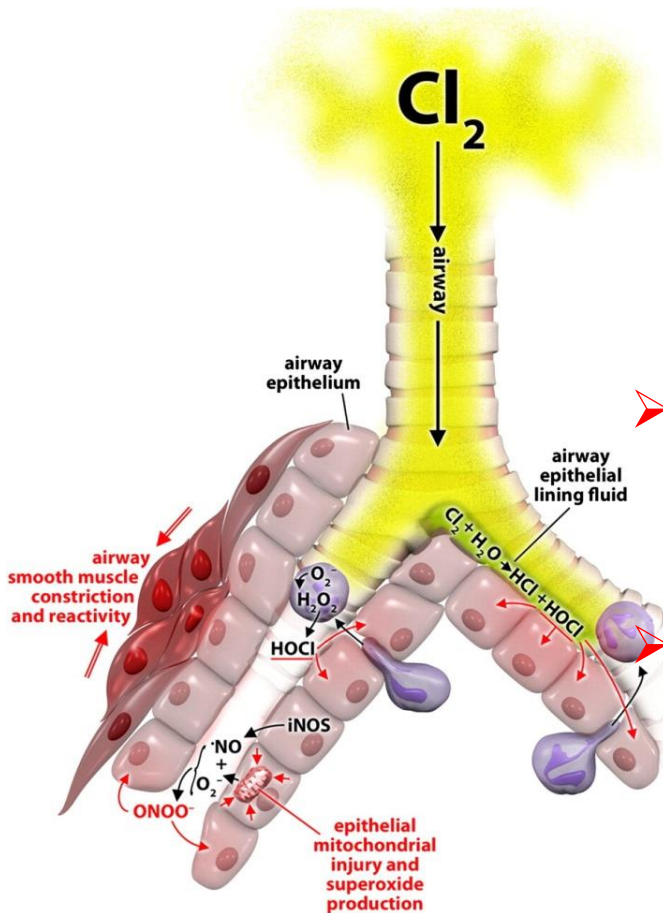
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# Chlorine

- Chlorine is one of the most widely used industrial chemicals in the world today for the manufacture of plastics, lubricants, and to purify water.
- It was the first chemical weapon used effectively on the WWI battlefield against unprotected military troops.
- Heavier than air and initially remains in low-lying areas
- The most harmful route of exposure is through breathing chlorine gas. Exposure may also result from skin contact or eye contact with Cl.



# Chlorine



- Exposed to very high concentrations may result in asphyxia with respiratory failure, pulmonary edema, cardiomegaly, pulmonary vascular congestion, acute burns of the upper and especially the proximal lower airways, and death.

- Clinical signs, including hypoxemia, wheezes, rales, and/or abnormal chest radiographs may be present.

More severely affected individuals suffer acute lung injury (ALI) and/or acute respiratory distress syndrome (ARDS).



# Chlorine

Chlorine gas, the simplest chemical weapon, on stage again



## Medical approach for Cl casualties

- Terminate exposure
- Execute the ABCs of resuscitation
- Enforce rest.
- Prepare to manage airway secretions and prevent/treat bronchospasm
- Prevent/treat pulmonary edema
- Prevent/treat hypoxia
- Prevent/treat hypotension

## Medical CBRN Department

### National / International Coordination

AFAD

Ministry of  
Health

Ministry of  
Defense

OPCW  
UN  
NATO

- \* **Medical CBRN Consultancy**
- \* **Ministry of Defense**
  - Directive of Turkish Armed Forces on Medical CBRN Defence
  - Member of Technology Panel
  - MOD CBRN Projects
- \* **Ministry of Health**
  - Medical CBRN Training
  - Member of Scientific Advisory Board of Emergency Health Services
- \* **OPCW**
  - Courses and Meetings
  - Laboratory Support
- \* **United Nations**
  - WMD Inspector
- \* **NATO (CBRN Working Groups, CBRN Exercises)**

## Medical CBRN Department

### • Analytical Laboratory

- Sampling and detection
- Laboratory safety conditions,
- GC-MS, Spectrophotometry
- Laminair flow-hoods,
- BioLab (PCR, culture, microbiological tests)
- Radiation Detectors

### • Research

- Method Development
- Experimental Animals
- Novel medications
- Cell culture studies

### • External QC

- OPCW Proficiency Test

### Laboratory

Analysis

Research

Biomedical

Environmental





BASIC RESEARCH



## Evidence of sulfur mustard exposure in victims of chemical terrorism by detection of urinary $\beta$ -lyase metabolites

Sermet Sezigen<sup>a</sup>, Rusen Koray Eyison<sup>a</sup>, Ertugrul Kilic<sup>b</sup> and Levent Kenar<sup>a</sup>

<sup>a</sup>Department of Medical CBRN Defense, University of Health Sciences, Ankara, Turkey; <sup>b</sup>Department of Anesthesia and Reanimation, SehitKamil State Hospital, Gaziantep, Turkey

Oral Presentation

Category: Mass Casualties and Disaster Medicine

### HEMATOLOGICAL CHANGES IN SULFUR MUSTARD VICTIMS INJURED IN RECENT SYRIAN CONFLICTS

COL KENAR Levent, MD, PhD1, COL ORTATATLI Mesut, MD, PhD1, KILIC Ertugrul, MD2, COL SEZIGEN Sermet, MD, PhD1, CPT EYISON Koray, MD1



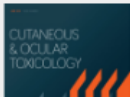
Oral Presentation

Category: Mass Casualties and Disaster Medicine

### ANALYSIS OF BETA LYASE METABOLITES OF SULFUR MUSTARD BY GC-MS/MS IN MEDICAL CBRN LABORATORY

COL SEZIGEN Sermet, MD, PhD, CPT EYISON Koray, MD, COL Mesut ORTATATLI, MD, PhD, COL Levent KENAR, MD, PhD  
University of Health Sciences, Dept. of Medical CBRN Defense Ankara, Turkey





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Original Article

# Acute intensive care unit management of mustard gas victims: the Turkish experience\*

Ertugrul Kilic, Mesut Ortatli , Sermet Sezigen, Rusen Koray Eyison &amp; Levent Kenar

Received 19 Feb 2018, Accepted 07 Apr 2018, Accepted author version posted online: 12 Apr 2018, Published online: 07 May 2018

 Download citation <https://doi.org/10.1080/15569527.2018.1464018>

Toxicology Letters

Volume 303, 15 March 2019, Pages 9-15



## Victims of chemical terrorism, a family of four who were exposed to sulfur mustard ☆

S. Sezigen <sup>a</sup> , K. Ivelik <sup>b</sup>, M. Ortatli <sup>a</sup>, M. Almacioglu <sup>c</sup>, M. Demirkasimoglu <sup>d</sup>, R.K. Eyison <sup>a</sup>, Z.I. Kunak <sup>a</sup>, L. Kenar <sup>a</sup>

Show more

<https://doi.org/10.1016/j.toxlet.2018.12.006>[Get rights and content](#)

## Optimized Gas Chromatography-Tandem Mass Spectrometry for 1,1'-sulfonylbis[2-(methylthio)ethane] Quantification in Human Urine

Rusen Koray Eyison, Sermet Sezigen , Mesut Ortatli, Levent Kenar

*Journal of Chromatographic Science*, bmz017,<https://doi.org/10.1093/chromsci/bmz017>Published: 18 March 2019 [Article history](#) ▾

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### Abstract

Sulfur mustard (SM) which is a bifunctional alkylating vesicant is one of the mostly used chemical warfare agent in First World War and the Iran–Iraq War.  $\beta$ -Lyase metabolites of SM especially 1,1'-sulfonylbis[2-(methylthio)ethane] (SBMTE) is an unequivocal biomarker of the exposure. An optimized gas chromatography-tandem mass spectrometry method was developed and validated for the retrospective detection of SBMTE in human urine. Urine



T.C. Sağlık Bakanlığı

T.C.



T.C. Sağlık Bakanlığı

**SAĞLIK BAKANLIĞI**

**KİMYASAL VE BİYOLOJİK TEHDİTLERE  
YAKLAŞIM ALGORİTMASI**

<http://docplayer.biz.tr/3407339-T-c-saglik-bakanligi-kimyasal-ve-biyolojik-tehditlere-yaklasim-algoritmasi.html>

# Practical Guide for Medical Management of Chemical Warfare Casualties

**Kimyasal Savaş Yaralılarının**

**Tıbbi Yönetimi İçin**

**Pratik Rehber**



**KSYÖ**

**Kimyasal Silahların Yasaklanması Örgütü**

**Uluslararası İşbirliği ve Yardım Bölümü**

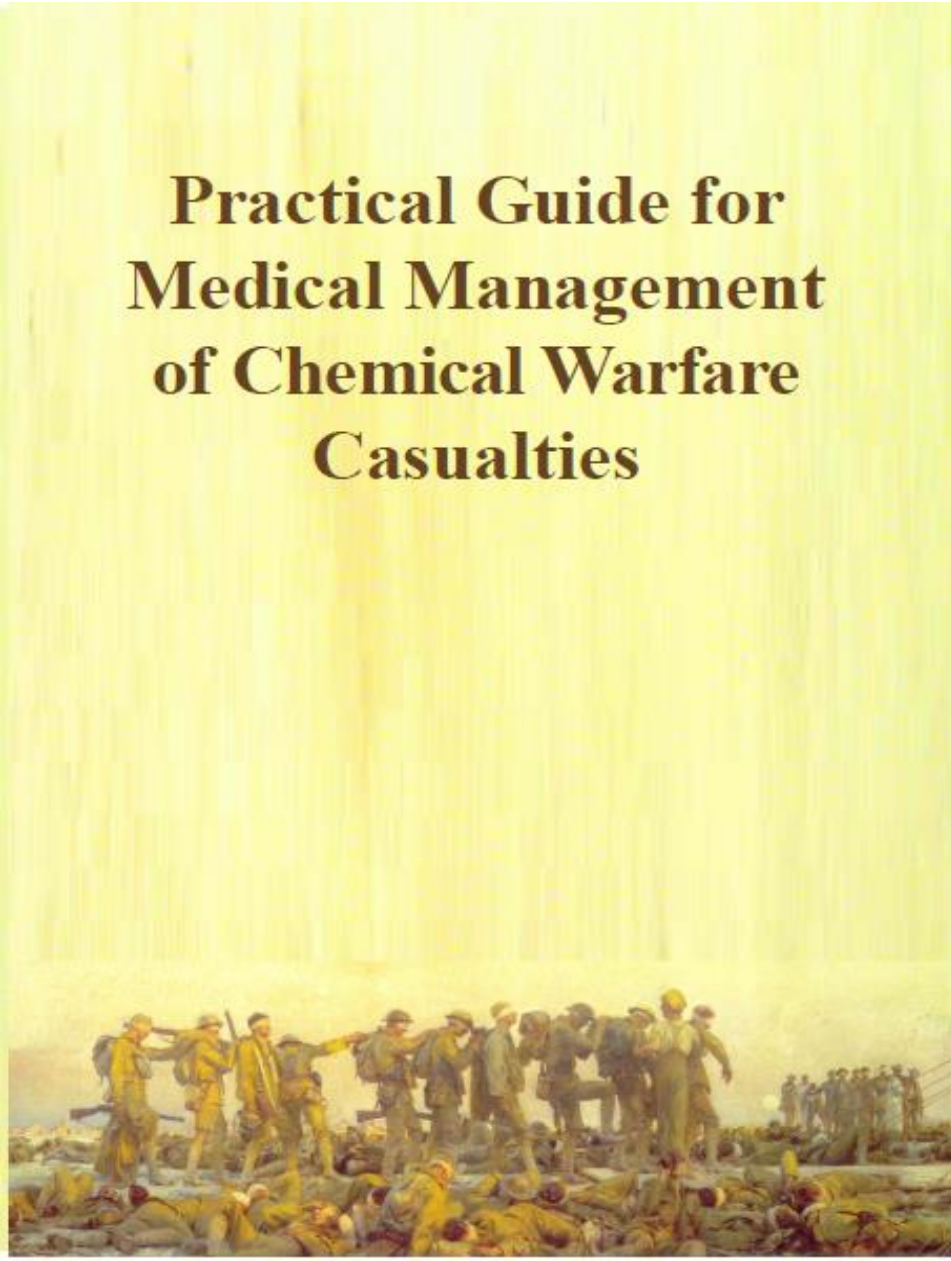
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**2016**

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**Prof.Dr.Levent KENAR**

**Yrd.Doç.Dr.Sermet SEZİGEN**



# Bilimsel gerçekler de kimyasal silah iddialarını yalanlıyor

Uzmanlar, Türk Silahlı Kuvvetleri'nin envanterinde kimyasal silah olmamasına karşın bir fotoğraf üzerinden "Türk Ordusu Beyaz Fosfor bombası kullanıyor" yalanını bilimsel analizlerle boşa çıkardı



"Kimyasal silahlar aynı zamanda kitte imha silahlardır. Sadece tek bir kişiyi etkilemesi mümkün değildir. Fotoğrafta sadece tek bir çocuk görünüyor. Sadece gövdede bir yanık gibi etkilenebilir, yüzünde herhangi bir etkilenebilir."

"Çocuğun cilt yaralarının bulunduğu bu fotoğrafın nerede ve ne zaman çekildiği belli değil ancak eski bir yanığa benziyor. Yeni bir yanık gibi durmuyor"

"Çocuğun gövdesinde yanık izleri bulunurken yüzünde ve alt bölümünde herhangi bir yanık bulgusuna rastlanmamaktadır ki, bu tür yanıkların yaygın bir şekilde bulunması beklenmektedir"

## "ENVANTERİMİZDE BİR GRAM KİMYASAL SİLAH YOK"

Millî Savunma Bakanı Hulusî Akar, yalan ve alçakça haberlerle kimyasal silah kullanımına yönelik iddiaların yayımlandığını belirterek, "Türk Silahlı Kuvvetlerinde bir gram kimyasal silah yok. Ne bunun atma vasıtası ne mühimmatı var. Envanterimizde yok" dedi

## "DIŞ BASINDA GÜNDEME GETİRİLEN İDDİALAR TAMAMEN GERÇEK DİŞİDİR"

MİLLÎ SAVUNMA BAKANLIĞI:  
"Türk Silahlı Kuvvetleri'nin başarısına gölge düşürmek isteyen çevrelerce özellikle dış basında gündeme getirilen 'Türk Silahlı Kuvvetleri tarafından kimyasal silah kullanıldığına' yönelik iddialar tamamen gerçek dışıdır"

## UZMANLAR MAKSATLI OLARAK ORTAYA ATILAN BU YALANLARI BİLİMSEL ANALİZLERLE BOŞA ÇIKARDI



Prof. Dr. LEVENT KENAR  
Sağlık Bilimleri Üniversitesi  
Öğretim Üyesi

"Fotoğrafta gösterilen olayın kimyasal silah kullanımına bağlı olmayacağı açıktır. Bilimsel veriler, bizi bu sonuca götürüyor. Kimyasal silah olsaydı tek bir vaka ile sınırlı olmazdı, onlarca, yüzlerce vaka olurdu"



## Turkey denies use of chemical weapons in anti-terror op

Turkish Armed Forces denies use of chemical weapons in northern Syria as Turkey does not have any chemical weapons

Selma Kasap, Merve Yıldızalp, Sela Sahin | 21.10.2019



## Turkey denies use of chemical weapons in anti-terror op

Dr. Levent Kenar, professor and chair of Department of Medical Chemical, Biological, Radiological and Nuclear (CBRN) Defense at University of Health Sciences in Turkey's capital Ankara, evaluated claims on TSK's use of chemical weapons.

"Chemical weapons are also weapons of mass destruction," said Kenar.

"It is not possible to affect only one person, the body of the child appearing on the photo is affected but there seems to be no effect on the face," he stressed.

"It is unclear where and when the wounded child's photo was taken, but it looks like the wounds are from an old burn," Kenar added.

Kenar emphasized that Turkey is party to the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (CWC)," which is why their use by Turkey is out of question.

"There is no diagnosis of the use of chemical weapons on a body with burn marks," he said.

"For evidence of such a claim, blood tests and environmental samples must be taken and examined at laboratories as those would be scientific facts," Kenar said.

cbndefence.org/kulfor-bombasi-iddialarina-kant-yok/

Durakotab

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TURKEY'S CBRN DEFENCE PLATFORM

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Yazılar

### Fosfor bombası iddialarına kanıt yok

23 Ekim 2019 admin Yorum bırakın

<https://www.cbnturk.com/video/dunya/fosfor-bombasi-iddialarina-kant-yok>

Şu kategoriye gönderildi: Tubas / Videos, Turkish

KBRN NEDİR?



Ara...



## Medical CBRN Department

- Dept. of Medical CBRN Defense
- Dept. of Emergency Medicine
- Dept. of Infectious Diseases
- Dept. of Internal Medicine
- Dept. of Respiratory Diseases
- Dept. of Psychiatry
- Dept. of Anaesthesia and Reanimation



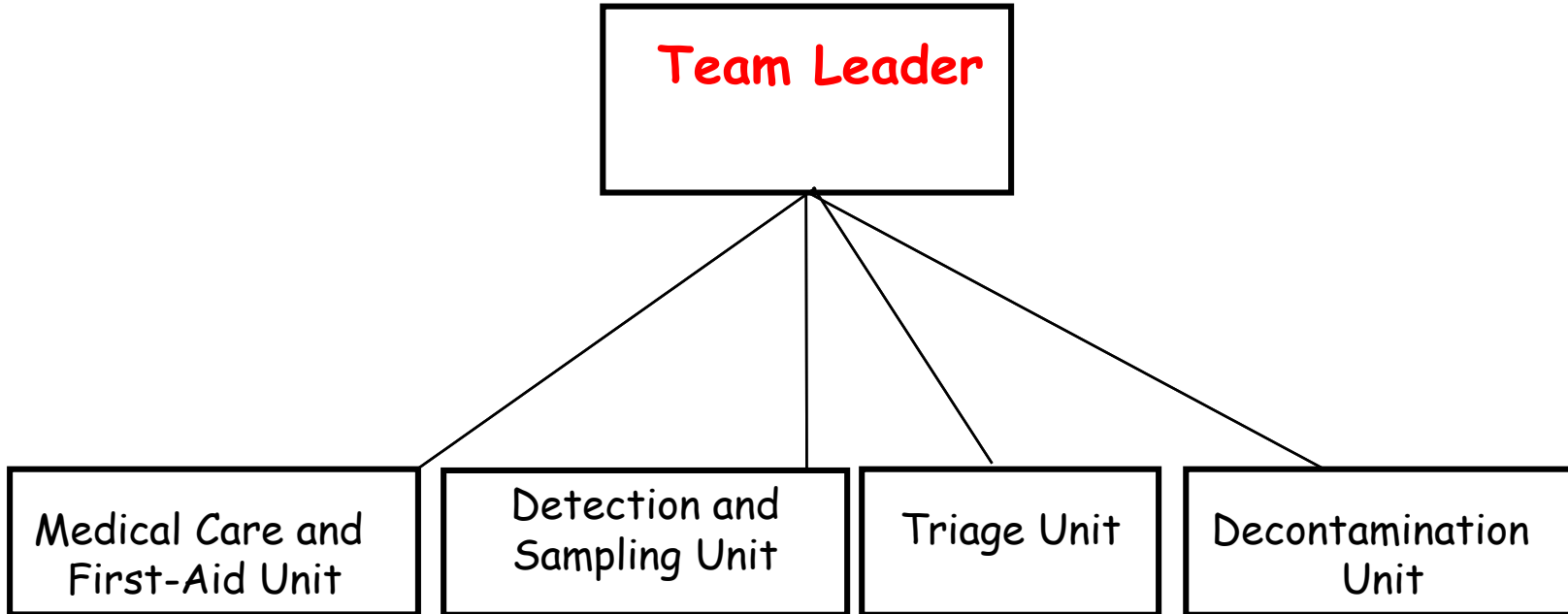
### CBRN Medical Response Team

Training and Equipment

National / International Exercises

Operational Tasks

Decon Center



## Equipment

Medical Treatment Devices,

Antidotes and Drugs

Personal Protective Equipment (Level A-B-C suit)

Detection Devices  
(CAM, sampling kits, radiation monitor, biodetector)

Decontamination Equipment  
(Decon tents, decon powders)





## Decontamination Center



## Decontamination Center



## LESSONS LEARNED

- An effective response to chemical incidents was *complex and multifunctional*
- Despite no large-scale chemical incident reported until now in Turkey, an *extense experience* was gained with respect to *medical and national preparedness* against both chemical war and chemical terrorism.
- The existence of a *unified commmand and control system* was a lack to ease the coordination between many organizations involved in emergency response to large-scale events, but still remained as a major challenge

## LESSON LEARNED

- Although much progress was made in *national care providers* in the management, **much work remained** to be done in terms of ensuring adequate and advanced staff competencies via *more disaster drills*, adequate hospital-based *decontamination unit* and negative pressure isolation system, and *adequate medical stockpiles* of personal protective equipment, pharmaceuticals, and ventilators.
- **Training of staff** should be continuous and supported with *education programs, conferences, meetings, table-top and hospital medical exercises* leading them through all over the country.

# COOPERATION BETWEEN BALKAN COUNTRIES AGAINST POSSIBLE CHEMICAL ATTACK



## COOPERATION BETWEEN BALKAN COUNTRIES

- **TRAINING**
  - ✓ CBRN preparedness and response
  - ✓ International Courses
  - ✓ PhD., MSc. Training programs.
  
- **FIRST AID AND RESCUE TEAM**
  - Bilateral training and exercises
  
- **REFERENCE LABORATORIES**
  - ✓ Scientific investigations
  - ✓ Verification studies
  - ✓ Laboratory network



# COOPERATION BETWEEN BALKAN COUNTRIES

- **EQUIPMENT EXCHANGE**
  - ✓ Protective equipment
  - ✓ Detector instrument
  - ✓ Vaccines and drug
  - ✓ Decontamination material
  
- **DISEASE SURVEILLANCE SYSTEM**
  - ✓ Epidemiologic investigation
  - ✓ Reporting network system
  - ✓ Exchange info
  
- **CBRN DEFENSE ADVISORY COMMITTEE**
  - Medical CBRN Officers
  - Military-Civilian CBRN experts



Chemical weapons are still a *great threat*, for which all medical and health care facilities must be prepared

**WE ARE READY FOR**

- Coordination
- Cooperation
- Mutual support







**Thank you**

[lkenarmd@gmail.com](mailto:lkenarmd@gmail.com)

+905322826759